A Rapid Technique for Monitoring Organophosphate Pesticides in Drinking Water

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The rapid detection of contaminants in our nation's drinking water has become a top homeland security priority in this time of increased national vigilance. Real-time monitoring of drinking water for deliberate or accidental fouling is key to national security. One new method that can be employed for the rapid screening of pollutants is Solid Phase Microextraction (SPME). The Office of Pesticide Programs Environmental Chemistry Laboratory is working to create and optimize such a method for the rapid detection of seven organophosphate (OP) pesticides in source waters for drinking water treatment systems which include surface and ground waters.

SPME is a rapid, sensitive, solvent-free system that can be used to screen for contaminants in a water system. Traditional pesticide residue determinations employ liquid-liquid extraction or solid-phase extraction followed by analysis with gas chromatography (GC) or high-pressure liquid chromatography (HPLC). They often require time-consuming sample preparations with extensive glassware and reagent requirements. SPME, on the other hand, requires only a fused silica fiber coated with a polymer and bonded to a stainless steel plunger. The fiber is submerged in a small water sample (2-10 ml) and stirred for a designated amount of time. This results in the adsorption of the analytes onto the fiber. The fiber is then placed into a hot chromatographic inlet where the analytes are desorbed onto the gas chromatography column. The analytes are separated on the chromatography column into individual components, enabling the investigator to measure the amount of analyte present.

Results of the validation study and data from real-world drinking water samples will be presented.

Illustrations: child drinking water from a fountain; picture of an SPME fiber setup, several graphic illustrations of profiles of the gas chromatograph peak height response to varying method conditions; and chart displaying results in real-world samples. Samples of the silica fiber will be available for inspection.